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NOTICE OF ALLOWANCE AND FEE(S) DUE

22852 7590 07/14/2008

FINNEGAN, HENDERSON, FARABOW, GARRETT & DUNNER
LLP
901 NEW YORK AVENUE, NW
WASHINGTON, DC 20001-4413

EXAMINER

LEE, RIP A

ART UNIT

PAPER NUMBER

1796

DATE MAILED: 07/14/2008

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/525,035	02/17/2005	Grant Berent Jacobsen	01435.0209-00000	3499
TITLE OF INVENTION: SUPPORTED POLYMERISATION CATALYSTS				

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	\$1440	\$300	\$0	\$1740	10/14/2008

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. **PROSECUTION ON THE MERITS IS CLOSED.** THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN **THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE** OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. **THIS STATUTORY PERIOD CANNOT BE EXTENDED.** SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the SMALL ENTITY status shown above.

If the SMALL ENTITY is shown as YES, verify your current SMALL ENTITY status:

A. If the status is the same, pay the TOTAL FEE(S) DUE shown above.

B. If the status above is to be removed, check box 5b on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and twice the amount of the ISSUE FEE shown above, or

If the SMALL ENTITY is shown as NO:

A. Pay TOTAL FEE(S) DUE shown above, or

B. If applicant claimed SMALL ENTITY status before, or is now claiming SMALL ENTITY status, check box 5a on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and 1/2 the ISSUE FEE shown above.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: **Mail** **Mail Stop ISSUE FEE**
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax **(571)-273-2885**

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

22852 7590 07/14/2008

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nonprovisional	NO	\$1440	\$300	\$0	\$1740	10/14/2008

EXAMINER	ART UNIT	CLASS-SUBCLASS
LEE, RIP A	1796	526-160000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

- ☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. Use of a **Customer Number is required.**

2. For printing on the patent front page, list

- (1) the names of up to 3 registered patent attorneys or agents OR, alternatively, 1 _____
(2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed. 2 _____
3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE

(B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent): ☐ Individual ☐ Corporation or other private group entity ☐ Government

4a. The following fee(s) are submitted:

- ☐ Issue Fee
☐ Publication Fee (No small entity discount permitted)
☐ Advance Order - # of Copies _____

4b. Payment of Fee(s): (Please first reapply any previously paid issue fee shown above)

- ☐ A check is enclosed.
☐ Payment by credit card. Form PTO-2038 is attached.
☐ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

5. Change in Entity Status (from status indicated above)

- ☐ a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27. ☐ b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature _____ Date _____
Typed or printed name _____ Registration No. _____

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

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Determination of Patent Term Adjustment under 35 U.S.C. 154 (b) (application filed on or after May 29, 2000)

The Patent Term Adjustment to date is 0 day(s). If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the Patent Term Adjustment will be 0 day(s).

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (<http://pair.uspto.gov>).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

Notice of Allowability

Application No.

10/525,035

Examiner

RIP A. LEE

Applicant(s)

JACOBSEN ET AL.

Art Unit

1796

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to April 14, 2008.
2. ☒ The allowed claim(s) is/are 1, 3, 4, 6, 7, 11-18, and 34-46.
3. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some* c) ☐ None of the:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
- (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
- 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
- (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO/SB/08),
Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application
6. ☐ Interview Summary (PTO-413),
Paper No./Mail Date _____
7. ☐ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

/Rip A. Lee/
Art Unit: 1796

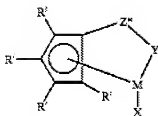
Allowable Subject Matter

The following is an examiner's statement of reasons for allowance: Claims 1, 3, 4, 6, 7, 11-18, and 34-46 are allowed over the closest references cited below.

The present invention is drawn to a method for the preparation of a supported polymerization catalyst system comprising combining (i) a porous support, (ii) a polymerizable monomer, (iii) a metallocene complex, and (iv) a cocatalyst in the order of (a) addition of the cocatalyst to the porous support, (b) addition of the polymerizable monomer, and (c) addition of the metallocene complex.

The metallocene complex has the formula CpMX_n ; salient features include: Cp is a single cyclopentadienyl or substituted cyclopentadienyl group optionally covalently bonded to M through a substituent, M is a group IVB metal, and optionally one X together with Cp forms a metallocycle with M (see claims for full structural details).

In one embodiment of the invention, the metallocene is represented by the general formula shown below; salient features include: M is titanium or zirconium in the +2 formal oxidation state, X is a neutral η^4 -bonded diene group having up to 30 non-hydrogen atoms which forms a π -complex with M (see claims for full structural details).



The following references are representative of the state of the art with respect to supported catalysts containing a porous support, cocatalyst, and metallocene of general formula CpMX_n : Canich *et al.* (U.S. 5, 057,475), Cady *et al.* (U.S. 6,462,161), Camahan *et al.* (U.S. 6,475,945), Maddox *et al.* (U.S. 6,437,060), and Reb *et al.* (U.S. 2003/0105252). Supported catalysts disclosed in these references are prepared by addition of cocatalyst to a porous support

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followed by addition of metallocene complex, or by addition of the contact product of metallocene complex and cocatalyst to the porous support. Subsequent polymerization or pre-polymerization in the presence of the supported catalyst allows for contact of polymerizable monomer with the supported catalyst.

The process of the present invention presents a departure from conventional processes for preparation of supported catalysts. In the present invention, cocatalyst is added to the support followed by the step of addition of polymerizable monomer to the support. In a subsequent step, a metallocene complex is added to the support. The inventive feature is addition of polymerizable monomer to the support prior to addition of metallocene. The resulting supported catalyst may be further contacted with further monomer in a polymerization or pre-polymerization reaction. The inventors disclose that polymerization carried out in the presence of supported catalyst prepared in this fashion exhibits a less deactivating kinetic profile compared with polymerization in the presence of supported catalyst prepared without addition of polymerizable monomer.

The prior art of Andell *et al.* (WO 97/27224; equivalent U.S. 6,225,423) relates to a process of pre-initiation of a homogeneous catalyst system with an unsaturated compound in order to stabilize and protect the active center against decomposition reactions that threaten it during the process of preparing a supported catalyst. The reference teaches formation of a solid reaction product by reacting (contacting in organic solvent) a transition metal compound with an unsaturated compound. In a practical embodiment, the solid reaction product is the contact product of a transition metal compound, an unsaturated compound, and an organoaluminum compound (aluminoxane or alkylaluminum). The solid reaction product is recoverable and may be used as catalyst in subsequent polymerization. A heterogeneous catalyst may be prepared by contacting a solution of the solid reaction product with an inert carrier.

Andell *et al.* does not teach or fairly suggest preparation of supported catalyst according to the process recited in the instant claims. Since the inventive feature of Andell *et al.* involves formation of a solid reaction product by reacting, minimally, a transition metal compound with an unsaturated compound, and since the solid contact product may be used as

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catalyst without any porous support, one having ordinary skill in the art would not have found it obvious to modify the process of Andell *et al.* by contacting unsaturated compound with support in the sequence described by the instant claims. In light of these teachings, it is concluded that the invention of the instant claims is patentably distinct over Andell *et al.*

Kamfjord *et al.* (*Macromol. Rapid Commun.*, 1998, 19, 505-509) discloses a process of preparing supported catalysts by an incipient wetness method. The principle of the incipient wetness method is to add only enough solution of catalyst component to fill the pores in the support. The first step comprises adding a toluene solution of cocatalyst (MAO) to silica. In a subsequent step, a solution of metallocene (BuCp)₂ZrCl₂ dissolved in unsaturated monomer (1-hexene, styrene, or 1,7-octadiene) is added to the support, whereby the liquid monomer is allowed to polymerize slowly. In these experiments, unsaturated monomer is used as diluent; apparently, this technique obviates use of additional solvent and allows for loading of metallocene (and monomer) according to the incipient wetness method.

Kamfjord *et al.* does not teach addition of (BuCp)₂ZrCl₂ and unsaturated monomer separately, with addition of unsaturated monomer to support prior to addition of metallocene, as would be required in the process of the instant claims. It would not have been obvious to one having ordinary skill in the art to modify the process of the prior art accordingly because there is no suggestion or teaching in Kamfjord *et al.* that such a modification adheres to the incipient wetness method for preparing supported catalysts. Furthermore, Kamfjord *et al.* does not disclose or fairly suggest preparation of catalysts comprising the metal complexes recited in the instant claims. In light of these teachings, it is concluded that the invention of the instant claims is patentably distinct over Kamfjord *et al.*

Rytter *et al.* (*Macromol. Rapid Commun.*, 2001, 22, 1427-1431) teaches a process for preparing supported catalyst by incipient wetness impregnation of silica with a solution of modified methylaluminoxane and (BuCp)₂ZrCl₂ dissolved in 1-hexene. The purpose of this methodology is to eliminate a step in which a toluene solution of methylaluminoxane cocatalyst is added to silica in a first step, followed by evaporation of excess solvent. Simultaneous addition of cocatalyst, unsaturated monomer, and metallocene also allows for homogeneous

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distribution of components throughout the support, rather than formation of a support core/polymer shell configuration obtained by following the process taught by Kamfjord *et al.*, *supra*. Therefore, it would not have been obvious to one having ordinary skill in the art to modify the process of Rytter *et al.* by preparing supported catalyst by sequential addition of components to a support as recited in the instant claims. Furthermore, Rytter *et al.* does not disclose or fairly suggest preparation of catalysts comprising the metal complexes recited in the instant claims. In light of these teachings, it is concluded that the invention of the instant claims is patentably distinct over Rytter *et al.*

Chang (U.S. 6,184,170) teaches a method of forming supported catalysts using an olefin promoter to enhance catalyst activity. Promoters are represented by general formulae: (1) $R-CH=CH_2$, where R is aryl or alkylaryl, (2) $R^1R^2R^3M-CH=CH_2$, where M is C, Si, Ge, or Sn, and (3) $Ph-SiR^1R^2-CH=CH_2$; these all qualify as polymerizable monomer. In another aspect of the invention, the catalyst system is prepared by including an alpha-olefin co-promoter, added after addition of the promoter. Suitable alpha-olefins include 1-butene, 1-hexene, and 1-octene.

Chang teaches that promoter may be added at any point during formation of the supported catalyst. A review of the processes illustrated in the disclosure and working examples is instructive. Catalysts are prepared by addition of the reaction product of metallocene and cocatalyst to support, followed by addition of promoter. In another method, metallocene and promoter are contacted for a designated time, the resulting contact product is combined with cocatalyst, and the mixture is added to support. In another process, the contact product of metallocene, cocatalyst, and promoter is added to support. One example of catalyst containing co-promoter is prepared by allowing metallocene and cocatalyst to react in a first step. In a second step, promoter (styrene) is allowed to react with the catalyst for a designated time. In a third step, co-promoter (1-hexene) is allowed to react with the resulting product. The reaction mixture is then added to support.

It can be seen that all catalysts in Chang are prepared by adding a contact product of metallocene and cocatalyst to a support. The reference does not teach or fairly suggest addition of metallocene and cocatalyst to support separately, as recited in the instant claims, and

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the reference does not teach addition of polymerizable monomer to support prior to addition of metallocene to support. Thus, it is deemed that one having ordinary skill in the art would not have sufficient motivation, and thus would not have found it obvious to modify the process disclosed in Chang. Furthermore, Chang does not disclose or fairly suggest preparation of catalysts comprising the metal complexes recited in the instant claims. In light of these teachings, it is concluded that the invention of the instant claims is patentably distinct over Chang.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rip A. Lee whose telephone number is (571)272-1104. The examiner can be reached on Monday through Friday from 9:00 AM - 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vasu S. Jagannathan, can be reached at (571)272-1119. The fax phone number for the organization where this application or proceeding is assigned is (571)273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <<http://pair-direct.uspto.gov>>. Should you have questions on the access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll free).

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July 9, 2008

/VASUDEVAN S. JAGANNATHAN/

Supervisory Patent Examiner, Art Unit 1796

Art Unit: 1796